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Strain hardening polypropylene fiber reinforced composite from hydrated ladle slag and gypsum

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1                   **STRAIN HARDENING POLYPROPYLENE FIBER**  
2                   **REINFORCED COMPOSITE FROM HYDRATED LADLE SLAG**  
3                   **AND GYPSUM**

4  
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12                   **Abstract**

13                   The use of industrial by-products brings both economic and environmental benefits. Ladle  
14                   slag (LS) from steel processes is a promising raw material and has been used as a precursor in a few  
15                   studies. To better understand the benefits of LS mainly on mechanical behavior, in this investigation,  
16                   an ettringite-based binder was produced from the hydration between LS and gypsum. The material  
17                   was reinforced with 2% v/v high tenacity polypropylene (HTPP) fiber to attain a high performance  
18                   fiber reinforced cementitious composite with pseudo strain hardening (PSH) behavior. In addition,  
19                   results of FEM numerical analysis show the accurateness of an available constitutive model in  
20                   predicting the mechanical response of the HTPP fiber reinforced hydrated LS composite.  
21                   Additionally, the experimental results reveal that using HTPP fiber greatly enhanced the mechanical  
22                   properties of the hydrated LS. Moreover, PSH behavior and eventually multiple fine cracks were  
23                   recorded by the digital image correlation (DIC) technique under uniaxial tensile tests. The  
24                   numerical simulations show the capability of the concrete damage plasticity (CDP) model to predict

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